

AMENDMENTS TO CLAIMS

Listing Of Claims

1. (currently amended) A method for packaging a semiconductor die comprising:

providing a leadframe;

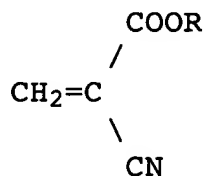
providing a cyanoacrylate adhesive material formulated to cure in less than about 60 seconds in a temperature of about 20°C to 30°C and an ambient atmosphere;

applying a volume of the adhesive material in viscous form to the leadframe or to the die;

pressing the die and the leadframe together ~~with a pressure, the pressure and the volume selected to form an adhesive layer between the die and the leadframe; and about 0.2 to 2 mils thick; and~~

polymerizing from 90-100% of the adhesive material without heating the die and the leadframe in less than about 60 seconds.

2. (previously presented) The method of claim 1 wherein the adhesive material has the formula:



wherein R comprises a hydrocarbon group.

3. (previously presented) The method of claim 1 further comprising applying a catalyst to the leadframe, to the die, or to the adhesive material prior to the polymerizing step.

4. (currently amended) The method of claim 1 wherein the volume is selected to form the adhesive layer with a selected thickness.

~~pressure is about 75 to 100 grams.~~

5. (previously presented) The method of claim 1 wherein the volume contains about 0.0025 to 0.0011 grams of the adhesive material.

6. (currently amended) A method for packaging a semiconductor die comprising:

providing a leadframe;

providing a cyanoacrylate adhesive material formulated to cure in less than about 60 seconds at a temperature of about 20°C to 30°C and in an ambient atmosphere;

providing ~~an in-line dispensing mechanism~~ a system configured to apply a volume of the adhesive material to the leadframe or to the die and to place the die in contact with the leadframe with a pressure;

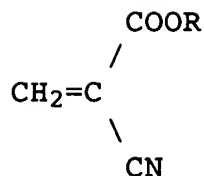
applying the volume of the adhesive material in viscous form to the leadframe or to the die using the system;

~~dispensing mechanism;~~

placing the die on the leadframe using the system with the adhesive material compressed between the die and the leadframe ~~with a pressure~~ to form an adhesive layer therebetween, and the volume and the pressure selected to form the adhesive layer with a selected thickness; and ~~of about 0.2 to 2 mils; and~~

polymerizing from 90% to 100% of the adhesive material without heating the die and the leadframe in less than about 60 seconds.

7. (previously presented) The method of claim 6 wherein the adhesive material has the formula:



wherein R comprises a hydrocarbon group.

8. (previously presented) The method of claim 6 wherein the system comprises a die attach machine.

~~dispensing mechanism comprises a mechanism selected from the group consisting of a syringe dispensing mechanism, a stenciling mechanism, a dip coating mechanism, a spraying mechanism, and a dot shooting mechanism.~~

9. (currently amended) The method of claim 6 wherein the system includes a dispensing mechanism is configured to form a plurality of dots of the adhesive material on the leadframe.

10. (previously presented) The method of claim 6 wherein the adhesive material includes an electrically conductive filler comprising a material selected from the group consisting of Ag, Ni and Fe.

11. (currently amended) The method of claim 6 wherein the volume contains about 0.0025 to 0.0011 grams of the adhesive material.

~~and the pressure is about 75 to 100 grams.~~

12. (currently amended) A method for packaging a semiconductor die comprising:

providing a leadframe comprising a mounting paddle;
providing an adhesive material in viscous form comprising a cyanoacrylate adhesive formulated to cure in

less than about 60 seconds at a temperature of about 20°C to 30°C and in an ambient atmosphere;

providing a die attach machine configured to align the die to the mounting paddle, to apply the adhesive material to the mounting paddle and to press the die and the mounting paddle together with the adhesive material therebetween;

applying a volume ~~containing about 0.0025 to 0.0011 grams~~ of the adhesive material to the mounting paddle using the die attach machine;

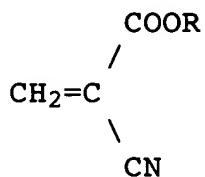
pressing the die on the adhesive material with a pressure ~~of about 75 to 100 grams~~ using the die attach machine; and

polymerizing from 90-100% of the adhesive material without heating the die and the leadframe at the temperature and in the ambient atmosphere in less than about 60 seconds.

13. (currently amended) The method of claim 12 wherein following the polymerizing step the adhesive material comprises an adhesive layer having a selected thickness.

~~of about 0.2 to 2 mils.~~

14. (previously presented) The method of claim 12 wherein the adhesive material has the formula:

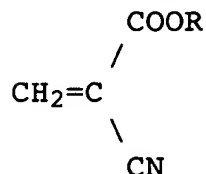


wherein R comprises a hydrocarbon group.

15. (currently amended) A method for packaging a semiconductor die comprising:

providing a leadframe;

providing an adhesive material having the formula:



wherein R is a hydrocarbon group, the adhesive material formulated to cure in less than about 60 seconds at a temperature of about 20°C to 30°C and in an ambient atmosphere;

applying a volume ~~containing about 0.0025 to 0.0011 grams~~ of the adhesive material in a viscous form to the leadframe or to the die;

placing the die on the leadframe with the adhesive material compressed between the die and the leadframe; and
~~with a pressure of about 75 to 100 grams; and~~

polymerizing from 90-100% of the adhesive material without heating the die and the leadframe in less than about 60 seconds.

16. (currently amended) The method of claim 15 wherein the applying step and the placing step are performed using a system comprising a leadframe feed mechanism for manipulating the leadframe, a vacuum tool for manipulating the die, and a dispensing mechanism for applying the volume of the adhesive material.

~~following the polymerizing step the adhesive material has a thickness of about 0.2 to 2 mils.~~

17. (currently amended) The method of claim ~~15~~ 16 wherein the adhesive material comprises a filler comprising a material selected from the group consisting of SiO₂, Al₂O₃, AlN, Ag, Ni, Fe, SiC, and polystyrene coated Ni.

18. (currently amended) The method of claim ~~15~~ 16 wherein the leadframe comprises a mounting paddle for supporting the die and the applying step ~~comprising~~ comprises applying the adhesive material to the mounting paddle.

19. (currently amended) The method of claim ~~15~~ 16 wherein the leadframe comprises a lead-on-chip leadframe comprising a plurality of lead fingers configured for wire bonding to the die and for supporting the die.

20. (currently amended) The method of claim ~~15~~ 16 wherein the system is configured to place the die on the leadframe during the placing step with a pressure, and the volume and the pressure are selected to form an adhesive layer of a selected thickness.

~~following the polymerizing step an adhesion force of the die to the leadframe is about 1.7 kg.~~

21. (currently amended) A method for packaging a semiconductor die comprising:

providing a leadframe;

providing an adhesive material comprising an anaerobic acrylic formulated to cure in less than about 60 seconds at a temperature of about 20°C to 30°C and in an ambient atmosphere;

applying a volume of the adhesive material in viscous form to the leadframe or to the die;

placing the die on the leadframe with the adhesive material compressed between the die and the leadframe ~~with a pressure, the pressure and the volume selected to form an adhesive layer;~~ and

~~about 0.2 to 2 mils thick; and~~

polymerizing from 90-100% of the adhesive material without heating the die and the leadframe in less than about 60 seconds.

22. (currently amended) The method of claim 21 wherein the applying step and the placing step are performed using a system comprising a leadframe feed mechanism for manipulating the leadframe, a vacuum tool for manipulating the die, and a dispensing mechanism for applying the volume of the adhesive material.

~~volume contains about 0.0025 to 0.0011 grams of the adhesive material and the pressure is about 75 to 100 grams.~~

Claims 23-39 (canceled)

40. (previously presented) The method of claim 21 further comprising applying a catalyst to the leadframe, to the die, or to the adhesive material prior to the polymerizing step.

41. (previously presented) The method of claim 21 wherein the leadframe comprises a lead-on-chip leadframe comprising a plurality of lead fingers configured for wire bonding to the die and for supporting the die.

42. (currently amended) A method for packaging a semiconductor die comprising:

providing a leadframe;

providing an adhesive material comprising a cyanoacrylate adhesive or an anaerobic acrylic formulated to cure in less than about 60 seconds at a temperature of about 20°C to 30°C and in an ambient atmosphere;

providing a filler in the adhesive material selected to tailor a characteristic of the adhesive material;

providing a die attach machine configured to align the die to the leadframe, to apply the adhesive material to the leadframe, and to press the die and the lead fingers together with the adhesive material therebetween with a pressure;

~~applying about 0.0025 to 0.0011 grams~~ a volume of the adhesive material in viscous form to the lead fingers using the die attach machine;

~~pressing the die and the leadframe together with a pressure of about 75 to 100 grams~~ with the adhesive material in contact with the die and the leadframe using the die attach machine; and

polymerizing from 90-100% of the adhesive material without heating the die and the leadframe at the temperature and in the ambient atmosphere in less than about 60 seconds.

~~to form an adhesive layer about 0.20 to 2 mils thick.~~

43. (currently amended) The method of claim 42 wherein the filler comprises an electrically insulating material or an electrically conductive material.

44. (previously presented) The method of claim 42 wherein the pressure and the volume are selected to form an adhesive layer with a selected thickness.

~~filler comprises an electrically conductive material.~~